

THE HERMIT CRABS OF DARWIN

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Introduction

The ocean and estuarine shores around Darwin incorporate a wide diversity of habitat types, including open sandy beaches, rocky platforms, sand and mud flats and mangrove forests. All of these habitats are home to a variety of crustaceans, including crabs, shrimps and the somewhat misnamed hermit crabs.

Hermit crabs are not true crabs, just as 'mantis shrimps' (stomatopods) are not true shrimps nor 'fish lice' (parasitic isopods) true lice. Hermit crabs resemble true crabs in the development of claws (chelae) on the first pair of legs (chelipeds) and in possessing stalked eyes. The tail (abdomen) of hermit crabs is not reduced in size as in true crabs however, and the antennae are longer than those of crabs. The second and third legs (pereiopods) are large and used for walking; the fourth and fifth pereiopods are small and grip the inner surface of the shell used as shelter. A stylised hermit crab is illustrated in Figure 1.

Classification of hermit crabs

There are two major ecological divisions of hermit crabs:

i) those that are aquatic (marine or estuarine) and breathe oxygen from the water via gills, and ii) those that are terrestrial with modified gill chambers acting as 'lungs' and breathing air. There are no truly freshwater hermit crabs.

There are two families of aquatic hermit crabs commonly collected intertidally and in shallow waters. These are the Diogenidae and Paguridae. In the former, the left cheliped is usually larger than the right or the chelipeds are approximately equal in size, while in the latter family the right cheliped is larger. A third family, the Parapaguridae, occurs in deep offshore waters but species are rarely seen except in deep water trawls.

The terrestrial hermit crabs comprise the family Coenobitidae. These hermits are usually associated with coastal areas but utilise seawater only to release fertilised eggs. Like most marine hermit crabs, the eggs hatch in seawater releasing planktonic larvae that metamorphose through several stages before settling onto the substrate and acquiring the first of their mobile homes.

It is of course the utilisation of gastropod shells as portable shelters that best characterises hermit crabs. Only the world's largest hermit crab, the coconut or robber crab *Birgus latro*, a coenobitid of tropical Indo-Pacific islands, does not utilise a mobile shelter as an adult,

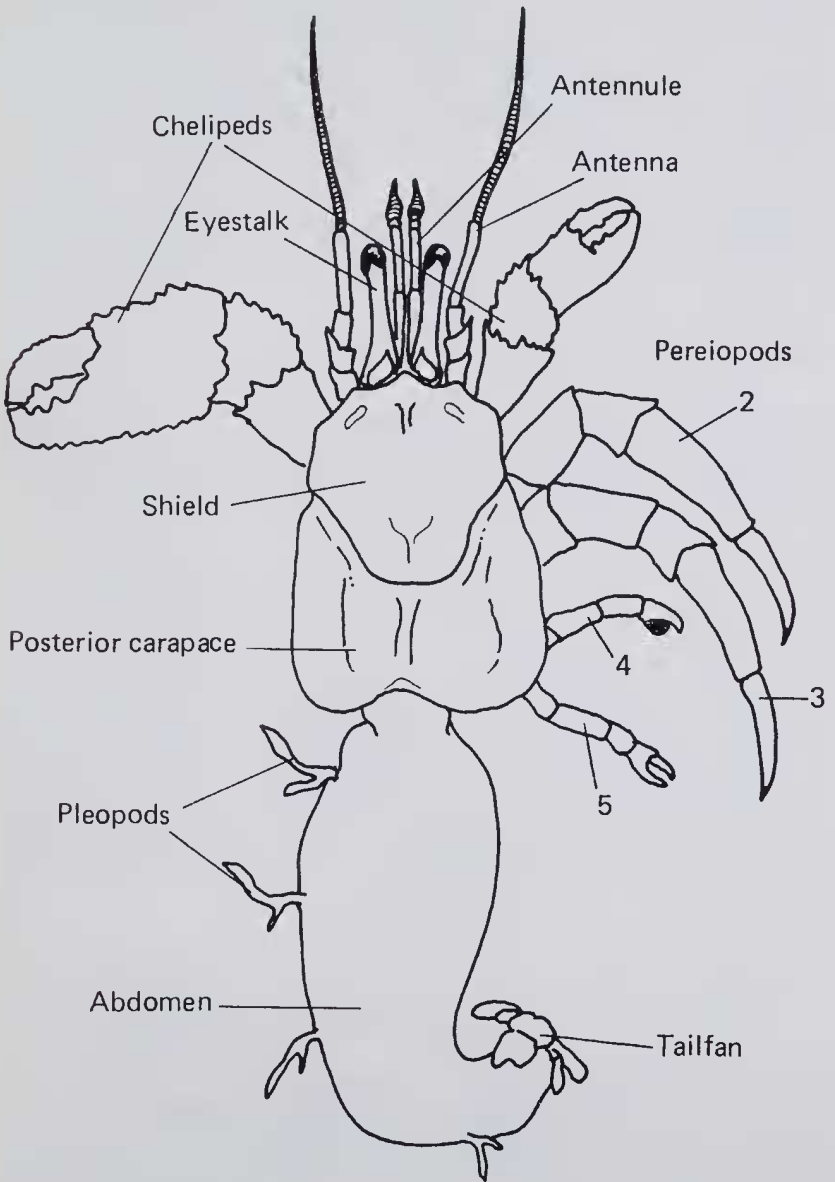


Fig. 1

though its small juveniles do so. This hermit has quite a calcareous abdomen which it folds underneath the thorax, quite unlike the coiled, soft abdomen of shell-living hermits. A few hermit crabs use alternatives to shells as shelters. Hollow soft rocks, such as pumice, and sponges are utilised as shelters by some hermits (e.g. species of *Cancellus*), and hermit crabs in aquaria have used artificial shells of transparent glass.

Hermit crabs of Darwin

The inshore seas and coastal regions of Darwin support very large populations of hermit crabs, both aquatic and terrestrial. While the terrestrial hermits are more obvious, the aquatic forms are more diverse and I will discuss these first.

Aquatic hermit crabs

The intertidal habitat is a difficult one for marine animals. Species must be adapted to exposure to the air and the consequent effects of drying (desiccation). Hermit crabs are admirably suited to this role. The gastropod shell acts as a water retention chamber and the crabs are quite mobile, moving to and from pools of water.

Seven species of aquatic hermit crabs are relatively common in the intertidal and shallow subtidal zones of Darwin. Other species occur in deeper waters offshore but are not considered here.

If the mud and sand flats of Darwin are closely examined, especially in or near drainage channels or seepages, huge numbers of small gastropod shells will be apparent. At first glance these may seem empty. Certainly most are devoid of their original occupant, the mollusc that secreted the shell. However many of these shells contain the diogenid hermit crab *Diogenes avarus*, a small species of rather innocuous appearance being a pale grey-brown in colour. The genus *Diogenes* can be recognised under magnification by the presence of a small movable rostrum between the eyestalks (Figure 2a). The left cheliped is much larger than the right and on the adult male of *D. avarus* is very elongate (Figure 2b).

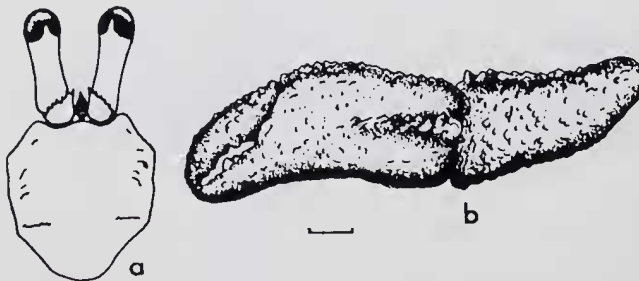


Fig. 2

A second species of *Diogenes* also occurs on intertidal flats of Darwin, in lower numbers than *D. avarus*. This is *D. gardineri*, distinguishable by its much more hairy (setose) appearance and less elongate left chelipeds on males.

Far more outstanding in coloration are members of another diogenid genus, *Clibanarius*. These hermit crabs attain larger sizes than *Diogenes*, have left and right chelipeds similarly sized and are often characterised by distinct bands of colour on the chelipeds, legs and body. In the Darwin environs, there are three very similar species of banded *Clibanarius*. One, *C. longitarsus*, has its eyestalks fairly uniformly coloured (Figure 3a), the lower surface being slightly paler than the olive green upper surface, while the legs are banded in blue-green and brown or orange. This species often occurs in or near mangrove forests, inhabiting shells of *Terebralia palustris* and *Telescopium telescopium*. The other two species have roughly similar banding on the legs but the eyestalks also bear longitudinal brown lines. *Clibanarius taeniatus* has a distinctive pattern of four broad blue-green bands on the anterior part of the body (shield) (Figure 3b), lacking on the third species, *C. infraspinitus*. These two species usually occur in rock pools, inhabiting a variety of rock platform gastropod shells. A fourth, less common species of *Clibanarius*, *C. virescens* is mostly brown-green and lacks banding on the legs. The terminal segments of pereopods two and three are cream, sometimes with a dark green or brown patch in the middle (Figure 3c).

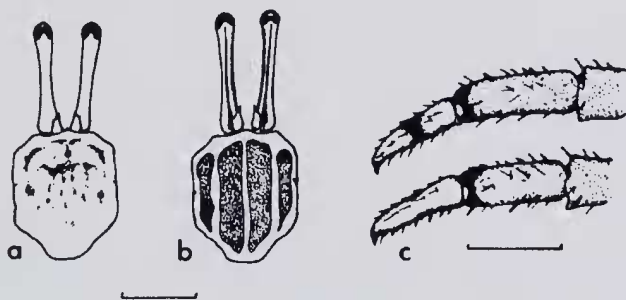


Fig. 3

Only one species of the family Paguridae has been recorded around Darwin. *Pagurus hedleyi* is a small hermit crab distinguished by its large right cheliped and brightly coloured eyestalks which are orange with a blue band around the centre.

Very little is known about the life histories or biology of Australia's aquatic hermit crabs. It is likely that most are scavengers, feeding on plant and animal debris. The high numbers of hermits in rock pools and on intertidal flats implies their consumption of primarily plant matter, including algae, and it is likely that they are important components of the feeding (trophic) chains of Darwin's intertidal communities. They are probably eaten by various fish and predatory crustaceans (e.g. swimming crabs) at high tide and by birds at low water.

Terrestrial hermit crabs

The most frequently encountered hermit crab of the Darwin area is the terrestrial coenobitid, *Coenobita spinosus* (Figure 4). Several species of *Coenobita* occur throughout the Indo-Pacific region but it appears that only *C. spinosus* is common in northern Australia.



Fig. 4

Some variation in coloration occurs across its range but Darwin specimens are generally pale brown with darker brown patches on legs, chelipeds and on the shield.

Many Darwin properties, especially those near the seashore, creeks and mangroves, are the tramping ground of these fascinating animals. The hermits breathe air via the vascularised walls of their gill chambers and will drown if maintained in water. Fresh water is drunk and used to moisten the chamber walls. These hermits are scavengers, consuming animal matter if available but primarily eating plant material including leaves of some native plants and vegetables. They have proven popular as pets, marketed under the undeserved label of 'crazy crabs'. The hermits can be kept in terraria with a small reserve of fresh water, feeding on vegetables such as lettuce and tomatoes. Sometimes a hermit will swap its present shell for a larger residence. All species of *Coenobita* are tropical and maintenance of warm conditions is desirable for their wellbeing. During the heat of the day, *C. spinosus* may clump in considerable numbers in cooler or moister areas.

Discussion

The Darwin area is similar to most tropical sites in that the hermit crab family Diogenidae is dominant over the Paguridae in terms of species diversity and numbers of individuals. In temperate seas, pagurids may be dominant over diogenids. The diversity of hermit species at Darwin is not high, but several species occur in remarkable numbers. It is a characteristic of many turbid or estuarine areas that while diversity of animals may be low, populations of successful species can be very high. Most of the Darwin hermit crabs have large distributions across the tropics of the Indian and Pacific Oceans, however *Pagurus hedleyi* may be restricted to northern Australia and the Arafura Sea.